



VEYRUM ROBOTICS STANDARD



VRS-IND-201

Industrial — AR Assessment Protocol

How the Industrial Application Rating letter is determined — sector criteria IND-1...IND-10, contributing intrinsic criteria, letter bands, tier ceilings and class applicability, with evidence by tier and underwriting use.

VEYRUM RESEARCH INSTITUTE

DOCUMENT

VRS-IND-201

VERSION

1.0.0

STATUS

Draft

DATE

15 September 2026

Contents

1 1 Scope

2 2 Normative references

3 3 Terms and definitions

4 4 Method of assessment

5 5 Contributing IR criteria

6 6 Sector criteria

6.1 6.1 IND-1 Anchor-regime conformity (0–15)

6.2 6.2 IND-2 Protective stop at envelope limits (0–15)

6.3 6.3 IND-3 Human/obstacle detection at declared conditions (0–12)

6.4 6.4 IND-4 Collaborative operation controls (0–10)

6.5 6.5 IND-5 Degraded-sensing behaviour (0–8)

6.6 6.6 IND-6 Restart and interlock discipline (0–6)

6.7 6.7 IND-7 Industrial duty-cycle throughput (0–10)

6.8 6.8 IND-8 Fault recovery and repair in industrial duty (0–8)

6.9 6.9 IND-9 Fleet network exposure controls (0–8)

6.10 6.10 IND-10 Industrial-context field record (0–8)

7 7 Letter bands, tier ceilings and class applicability

8 8 Evidence by tier

9 9 Underwriting and credit use

10 10 Result recording

11 11 Assessor checklist

12 Annex A (informative) – Worked example

13 Bibliography

14 Change history

Foreword. This Assessment Protocol determines the **Industrial Application Rating (AR)** letter for a robot model in a declared industrial application class. It scores a **pool** of criteria — the ten sector criteria of Clause 6 (IND-1...IND-10, 100 points) plus the named intrinsic criteria of Clause 5, each scored once under its own standard and counted here — and expresses the earned points as a percentage of the applicable pool, which maps to a letter **C < B < A < AA < AAA (AAA best)** by the bands of VRS-GEN-006 §4. Every criterion is bounded by an evidence tier — Unverified, Verified, Certified — so the best attainable letter rises with substantiation, not assertion. This edition supersedes the re-weighted-mean model of the 0.x drafts: no weighting, no separate grade bands, no separate modifiers — the tier limits fall out of the per-criterion ceilings of Clause 6. An Industrial AR is an opinion above the compliance floor, not a certification, and nothing here implies that any real robot holds a Veyrum rating (ratings are not published). Requirements use “shall”; recommendations use “should”.

1 Scope

1.1 This Protocol defines, for the **Industrial** sector Application Rating: the determination method (Clause 4); the contributing intrinsic criteria drawn into the pool (Clause 5); the ten sector criteria IND-1...IND-10 with their point ladders and tier ceilings (Clause 6); the letter bands, pool ceilings and class applicability (Clause 7); the evidence admissible at each tier (Clause 8); underwriting and credit use (Clause 9); result recording (Clause 10); and the assessor checklist (Clause 11). A worked example is at Annex A.

1.2 The AR shall be issued **per application class**. The industrial application classes are **mobile** (driverless industrial trucks, AGV/AMR), **manipulator** (fixed or mounted industrial robot arms and cells) and **legged-other** (legged or other industrial platforms without a recognised anchor regime), per VRS-IND-001 §4. Sector applicability, the hazard taxonomy and the anchor regime are defined in VRS-IND-001 and are not restated here.

1.3 The AR shall be assessed at one of three **tiers** — Unverified, Verified, Certified. Each criterion states the maximum points reachable at each tier (Clause 6); the AR tier is the tier whose evidence bar the assessed evidence meets and shall not exceed the model’s Intrinsic Rating tier (VRS-GEN-006 §7). The underlying point aggregation and the letter bands are defined in VRS-GEN-005/006 and are not restated here.

2 Normative references

- **VRS-IND-001**, Industrial — Sector Standard — applicability, application classes, hazard groups and the industrial anchor regime.
- **VRS-GEN-005**, Intrinsic Rating — Methodology — point aggregation, tiers, cold-start parity and the company-wide fallback rule (§6).
- **VRS-GEN-006**, Application Rating — Scheme — the letter bands, the applicable-pool percentage and the tier rule.
- **VRS-GEN-009**, Robot Risk Passport and Registry Schema — the record that carries the AR result.

- **VRS-GEN-012**, Evidence Grades and Data Requirements — evidence kinds and the tier evidence bars.
- **VRS-GEN-101 ... VRS-GEN-106**, IR Category Standards — the intrinsic criteria contributed under Clause 5.
- **ISO 10218-1:2025 / ISO 10218-2:2025**, Robotics — Safety requirements (industrial robots; robot applications and cells) — manipulator-class anchor (absorbs ISO/TS 15066:2016).
- **ISO 3691-4:2023**, Industrial trucks — Driverless industrial trucks and their systems — mobile-class anchor.
- **ANSI/A3 R15.08** (Parts 1–3, 2020–2026), Industrial Mobile Robots — Safety Requirements — mobile-class anchor (US).
- **IEC 62443-4-2:2019**, Security for industrial automation and control systems — component requirements.
- **ISO 14224:2016**, Collection and exchange of reliability and maintenance data for equipment.
- Data twin: **VRS-IND-501** (generated from this Protocol, never hand-edited).

3 Terms and definitions

Terms per VRS-GEN-001 (aligned to ISO 8373:2021) and VRS-IND-001. Locally:

- **pool** — the set of criteria whose points determine the AR letter: the ten sector criteria of Clause 6 together with the contributing intrinsic criteria of Clause 5.
- **applicable pool** — the pool for a given application class after criteria not applicable to that class are removed from both the earned points and the pool range (Clause 4; VRS-GEN-006 §6).
- **contributor** — an intrinsic criterion scored once under its own IR category standard and counted again in the sector pool at the same points (Clause 5).
- **tier** — the evidence stringency at which a criterion is assessed: **Unverified** (public evidence only), **Verified** (manufacturer evidence pack examined), **Certified** (behaviour witnessed).
- **ceiling** — the maximum points a criterion awards at a given tier; points earned are capped at the ceiling of the assessed tier.
- **evidence bar** — the minimum evidence a criterion requires before any points are awarded; below it the criterion scores 0.
- **company-wide fallback** — the substitute points a criterion allows from manufacturer-wide evidence when model-specific evidence is unavailable (VRS-GEN-005 §6).

4 Method of assessment

4.1 The Industrial AR shall be determined as a percentage of the **applicable pool** and mapped to a letter by the bands of VRS-GEN-006 §4 (Clause 7.1). The pool is the ten sector criteria of Clause 6 (IND-1... IND-10, 100 points) together with the contributing intrinsic criteria of Clause 5, each scored once under its own standard and counted here at the same points. For an application class the assessor shall add the points earned across the applicable criteria and divide by the sum of the point ranges of those same criteria; a criterion not applicable to the class (Clause 6 Applicability row; VRS-GEN-006 §6) shall be removed from both the earned points and the pool range. No weighting is applied — each criterion's point

range sizes its own importance — and no separate modifiers operate on the letter: the tier limits follow from the per-criterion ceilings of Clause 6 (Clause 7.2; VRS-GEN-006 §8).

4.2 Evidence shall be attributable to the declared **application class** of the assessed envelope (mobile, manipulator or legged-other; Clause 1.2) and to industrial context; the AR letter covers only the assessed classes.

4.3 Letters shall be issued **per application class** where evidence diverges materially between classes; the displayed sector letter shall be the **lowest issued class letter**. A class for which no letter can be issued shall be displayed as *not covered*, and the assessed envelope shall contract to the classes the evidence covers.

4.4 Evidence obtained outside a declared application class shall be **inadmissible** as support for that class; the letter shall not be extended to conditions never observed. Shared-workspace collaborative performance shall not be inferred from caged fixed-cell evidence: the interaction is the risk being rated, so a collaborative claim shall rest on power-and-force-limiting or speed-and-separation verification for the manipulator class that declares it (IND-4).

5 5 Contributing IR criteria

5.1 The sector pool consists of the sector criteria of Clause 6 and the following intrinsic criteria, scored once under their own standards and counted again here at the same points:

IR CRITERION	SCORED UNDER
SF-1	VRS-GEN-101 §6.1
SF-2	VRS-GEN-101 §6.2
SF-4	VRS-GEN-101 §6.4
SF-7	VRS-GEN-101 §6.7
SF-8	VRS-GEN-101 §6.8
RL-3	VRS-GEN-102 §6.3
RL-4	VRS-GEN-102 §6.4
SV-1	VRS-GEN-103 §6.1
SV-4	VRS-GEN-103 §6.4
SV-5	VRS-GEN-103 §6.5
SV-6	VRS-GEN-103 §6.6
CY-3	VRS-GEN-105 §6.3
CY-4	VRS-GEN-105 §6.4
MS-1	VRS-GEN-106 §6.1
SI-2	VRS-GEN-104 §6.2
SI-6	VRS-GEN-104 §6.5

5.2 No other intrinsic criterion contributes. Points, ceilings and applicability of a contributing criterion are those of its own standard; where a contributing criterion is not applicable to the assessed application class it is removed from the pool for that class (VRS-GEN-006 §6).

6 Sector criteria

6.0 Summary. Points and tier ceilings per criterion; totals reproduce by addition.

§	CRITERION	POINTS	UNVERIFIED CEILING	VERIFIED CEILING	CERTIFIED CEILING
6.1	IND-1 Anchor-regime conformity	0–15	11	13	15
6.2	IND-2 Protective stop at envelope limits	0–15	8	12	15
6.3	IND-3 Human/obstacle detection at declared conditions	0–12	8	10	12
6.4	IND-4 Collaborative operation controls	0–10	6	9	10
6.5	IND-5 Degraded-sensing behaviour	0–8	4	6	8
6.6	IND-6 Restart and interlock discipline	0–6	6	6	6
6.7	IND-7 Industrial duty-cycle throughput	0–10	8	8	10
6.8	IND-8 Fault recovery and repair in industrial duty	0–8	6	6	8
6.9	IND-9 Fleet network exposure controls	0–8	7	7	8
6.10	IND-10 Industrial-context field record	0–8	6	8	8
Total		100	70	85	100

6.1 IND-1 Anchor-regime conformity (0–15)

ROW	
What is measured	Conformity of the declared application class with its anchor regime. Anchors per class (F22): mobile – ISO 3691-4:2023 (+ ANSI/ITSDF B56.5, RIA R15.08); manipulator – ISO 10218-1/-2:2025 (+ ISO/TS 15066 values); legged / other – <i>no recognised anchor</i> : scored on ISO 12100 risk assessment + functional-safety evidence (ISO 13849-1 / IEC 62061) using the same rungs.
Ladder	15 = third-party-assessed conformity and functions validated at envelope limits · 13 = pack-evidenced (documents), not demonstrated · 12 = third-party-assessed conformity (publicly verifiable certificate) (F1/F17) · 11 = publicly evidenced only (no pack, no demonstration) · 10 = self-declared conformity with internal validation evidence · 5 = self-declaration only · 0 = none
Unverified — evidence & ceiling	Public DoC; public certificate registers / listings. Ceiling 11.
Verified — evidence & ceiling	DoC + third-party reports/certificates + internal validation. Ceiling 13.
Certified — evidence & ceiling	Safety functions witnessed at envelope limits (IND-2...IND-5) confirm the validation evidence. Ceiling 15.
Company-wide fallback	n/a
Evidence bar	A declaration of conformity or equivalent exists for the rated version. Applies to all classes.
Applicability	mobile · manipulator · legged-other (VRS-IND-201 §7 class table)

6.2 6.2 IND-2 Protective stop at envelope limits (0–15)

ROW	
What is measured	Protective/safeguard stop performance at declared max speed and max payload and max slope and worst declared floor (limits, not nominal – IND-101 §4.1).
Ladder	15 = stops within declared distance in all four witnessed · 12 = pack-evidenced (documents), not demonstrated · 10 = three · 8 = stop functions certified by an accredited third party with published stopping time/distance data at scenario limits (F17) · 5 = two, or nominal only · 0 = fewer or not established
Unverified — evidence & ceiling	Public third-party test; public certificate with stopping data. Ceiling 8.
Verified — evidence & ceiling	Functional-safety validation reports at each limit; certificate. Ceiling 12.
Certified — evidence & ceiling	Witnessed protective stops at each declared limit with manufacturer-supplied load, ramp, floor sample; stopping distance against floor marks; feed shows stop state. Ceiling 15.
Company-wide fallback	n/a
Evidence bar	Envelope declared with numeric limits. Applies to all classes (for manipulators: stop at max speed/payload/reach).
Applicability	mobile · manipulator · legged-other (VRS-IND-201 §7 class table)

6.3 6.3 IND-3 Human/obstacle detection at declared conditions (0–12)

ROW	
What is measured	Detection of a test obstacle of the declared minimum detectable size at declared max speed, including switching-field transitions and declared ambient-light boundary.
Ladder	12 = detected and stopped in all declared conditions · 10 = pack-evidenced (documents), not demonstrated · 8 = nominal + one boundary · 4 = nominal only · 0 = not established. Applies to: mobile class only. Not applicable to manipulators (protection is PFL/SSM under IND-4) or to legged/other without a declared detection field — excluded from numerator and denominator (F12).
Unverified — evidence & ceiling	Public third-party detection test. Ceiling 8.
Verified — evidence & ceiling	Detection-field validation evidence (scanner data sheets + validation at declared conditions). Ceiling 10.
Certified — evidence & ceiling	Witnessed detection/stop with a declared-size test obstacle at declared speed and at the declared lighting boundary. Ceiling 12.
Company-wide fallback	n/a
Evidence bar	Minimum detectable object size and ambient-light envelope declared.
Applicability	mobile · manipulator · legged-other (VRS-IND-201 §7 class table)

6.4 6.4 IND-4 Collaborative operation controls (0–10)

ROW	
What is measured	For declared collaborative modes: speed-and-separation zone behaviour and/or power-and-force limiting at declared limits (ISO/TS 15066 values as absorbed into ISO 10218:2025).
Ladder	10 = all declared modes established at limits · 9 = pack-evidenced (documents), not demonstrated · 6 = established nominal · 3 = design evidence only · 0 = not established. Models declaring no collaborative mode: fixed 6 (non-collaborative by design, guarded per IND-1) — recorded as such
Unverified — evidence & ceiling	Public third-party report. Ceiling 6.
Verified — evidence & ceiling	Collaborative-mode validation evidence (zone tests; force/pressure measurements against limits). Ceiling 9.
Certified — evidence & ceiling	Witnessed zone transitions on the feed as an obstacle approaches; PFL contact on a compliant target with the manufacturer’s force/pressure reading shown on camera against the declared limit. Ceiling 10.
Company-wide fallback	n/a
Evidence bar	Collaborative modes declared (or explicitly declared absent).
Applicability	mobile · manipulator · legged-other (VRS-IND-201 §7 class table)

6.5 6.5 IND-5 Degraded-sensing behaviour (0–8)

ROW	
What is measured	With a declared sensor partially obscured / at worst declared lighting, the robot enters its declared safe state.
Ladder	8 = safe state in all declared degraded conditions · 6 = pack-evidenced (documents), not demonstrated · 4 = in some · 0 = not established or unsafe
Unverified — evidence & ceiling	Public third-party test or published validation summary covering degraded conditions. Ceiling 4.
Verified — evidence & ceiling	Degraded-condition validation evidence. Ceiling 6.
Certified — evidence & ceiling	Witnessed obscuration and worst-lighting cases; feed shows fault/safe state. Ceiling 8.
Company-wide fallback	n/a
Evidence bar	Degraded conditions declared in the envelope.
Applicability	mobile · manipulator · legged-other (VRS-IND-201 §7 class table)

6.6 6.6 IND-6 Restart and interlock discipline (0–6)

ROW	
What is measured	No resumption after protective/e-stop without the declared deliberate reset; no start with a zone/guard violated; reset requires the declared authority.
Ladder	6 = all three witnessed, or all three documented in the public/pack safety documentation (F3) · 3 = partial · 0 = resumes automatically. Applies to all classes
Unverified — evidence & ceiling	Manual describes reset behaviour. Ceiling 6.
Verified — evidence & ceiling	Safety-function specification + manual. Ceiling 6.
Certified — evidence & ceiling	Witnessed reset attempts (unauthorised reset refused; zone-violated start refused). Ceiling 6.
Company-wide fallback	n/a
Evidence bar	Reset behaviour documented.
Applicability	mobile · manipulator · legged-other (VRS-IND-201 §7 class table)

6.7 6.7 IND-7 Industrial duty-cycle throughput (0–10)

ROW	
What is measured	Declared cycle time / throughput honoured under representative multi-cycle work.
Ladder	10 = witnessed at declared throughput ($r = 1.0$) · 8 = throughput measured by a third party or by the manufacturer’s test evidence within tolerance, not witnessed · 6 = $r = 0.6$ · 3 = $r = 0.3$ · 0 = $r = 0$ or no measurement
Unverified — evidence & ceiling	Editorial/third-party throughput tests. Ceiling 8.
Verified — evidence & ceiling	Manufacturer’s throughput and duty-cycle test evidence. Ceiling 8.
Certified — evidence & ceiling	Witnessed N cycles of the declared representative task; count from feed, time from video. Ceiling 10.
Company-wide fallback	n/a
Evidence bar	A throughput or cycle-time claim exists.
Applicability	mobile · manipulator · legged-other (VRS-IND-201 §7 class table)

6.8 6.8 IND-8 Fault recovery and repair in industrial duty (0–8)

ROW	
What is measured	Operator-level fault recovery and field-replaceable repairs achievable within declared times using the manual.
Ladder	8 = recovery + a module swap within declared times · 6 = evidenced by documents alone (public or pack), not demonstrated · 5 = recovery only · 2 = documented only · 0 = not documented
Unverified — evidence & ceiling	Public service manual. Ceiling 6.
Verified — evidence & ceiling	Service manual + parts catalogue with lead times + repair record (time-to-repair). Ceiling 6.
Certified — evidence & ceiling	Witnessed induced fault diagnosed via HMI and cleared per the manual; witnessed battery/module swap, timed. Ceiling 8.
Company-wide fallback	Repair record: model-specific 5 / company-wide 4 (Verified)
Evidence bar	Service manual exists.
Applicability	mobile · manipulator · legged-other (VRS-IND-201 §7 class table)

6.9 IND-9 Fleet network exposure controls (0–8)

ROW	
What is measured	Robot operates in a segmented/offline industrial network; updates are signed and operator-controlled; remote access is off by default and auditable.
Ladder	8 = all established live · 7 = documented in detail and covered by a public third-party security certificate/audit · 5 = two established · 4 = documented in detail (offline mode, signing, access model, ports) (F3) · 2 = documented only · 0 = none
Unverified — evidence & ceiling	Public manual / network guidance / security documentation. Ceiling 7.
Verified — evidence & ceiling	SBOM, update-mechanism description, access model, vulnerability policy. Ceiling 7.
Certified — evidence & ceiling	Witnessed on the robot's own console: signed update applied, unsigned refused; remote access toggled; offline-mode operation. Ceiling 8.
Company-wide fallback	n/a
Evidence bar	Update and access model documented. Applies to all classes.
Applicability	mobile · manipulator · legged-other (VRS-IND-201 §7 class table)

6.10 IND-10 Industrial-context field record (0–8)

ROW	
What is measured	Incident and availability record in industrial deployments over the manufacturer's declared window.
Ladder	8 = no unremediated major incident and availability $\geq$ declared · 6 = publicly evidenced only (no pack, no demonstration) · 5 = incidents all remediated, availability near declared · 3 = public regulator/recall databases searched with recorded coverage, none found (null-result rung, F2) · 2 = unremediated minor incidents or availability materially below · 0 = unremediated major incident. Regime rule (F19): full Unverified ceiling where a public reporting regime covers the class
Unverified — evidence & ceiling	Public recall/safety-notice databases, regulator incident records. Ceiling 6.
Verified — evidence & ceiling	Model-specific incident register + availability/downtime record. Ceiling 8.
Certified — evidence & ceiling	No demonstration step — scores from the Verified evidence. Ceiling 8.
Company-wide fallback	Company-wide register + availability: ceiling 6
Evidence bar	Fleet exposure figures declared (model or company), or a null-result search recorded. Applies to all classes.
Applicability	mobile · manipulator · legged-other (VRS-IND-201 §7 class table)

7 Letter bands, tier ceilings and class applicability

7.1 Bands (VRS-GEN-006 §4). AAA $\geq$ 90 % · AA $\geq$ 75 % · A $\geq$ 60 % · B $\geq$ 45 % · C below 45 % of the applicable pool.

7.2 Pool ceilings. Sector criteria alone: Unverified 70/100 (70 %) · Verified 85/100 (85 %) · Certified 100. With the contributing criteria of Clause 5 the pool ceilings are as recorded in VRS-IND-501; in both forms the best attainable letter is A at Unverified, AA at Verified and AAA at Certified (VRS-GEN-006 §8).

7.3 Application classes. mobile · manipulator · legged-other (VRS-IND-201 §7 class table). A criterion whose Applicability row excludes the assessed class is removed from both the numerator and the denominator; the letter is issued per class and the displayed letter is the lowest (Clause 4).

7.4 No modifiers, caps or gates operate on the letter other than the ceilings of Clause 6 and the tier rule of VRS-GEN-006 §7.

8 Evidence by tier

8.1 Unverified. The assessor works only from evidence obtainable without the manufacturer’s cooperation: datasheets, manuals and safety documentation, published declarations of conformity and the standards they cite, public certificate registers and class marks, published test summaries, and — for the field-record criterion (IND-10) — public recall, safety-notice and regulator incident databases. Each criterion’s Unverified ceiling (Clause 6) is the most an honest reading of such evidence shall earn; the AR tier is **Unverified**.

8.2 Verified. The assessor additionally examines a manufacturer evidence pack and shall accept, by mapping, the conformity artefacts the manufacturer already holds: the ISO 10218-2:2025 application risk assessment and the ISO 10218-1:2025 robot safety evaluation (manipulator class); the ISO 3691-4:2023 or ANSI/A3 R15.08 detection and safe-stop verification (mobile class); power-and-force-limiting or speed-and-separation verification reports for declared collaborative modes; functional-safety validation reports (ISO 13849-1:2023 / IEC 62061:2021) for the legged-other class; ISO 14224:2016 reliability and maintenance records; the IEC 62443-4-2:2019 component-security evaluation and software bill of materials; and the model-specific incident and availability register. Adoption is therefore a mapping, not new testing. Verified ceilings apply only to criteria whose pack items are present and examined; the AR tier is **Verified**.

8.3 Certified. The assessor witnesses the declared behaviour on the robot and its own console: protective stops at each declared envelope limit (IND-2), detection and stop with a declared-size obstacle (IND-3), collaborative zone transitions and power-and-force-limiting contact against the declared limit (IND-4), degraded-sensing safe states (IND-5), reset and interlock discipline (IND-6), a timed representative duty cycle (IND-7), an induced-fault recovery and module swap (IND-8), and signed-update and remote-access controls (IND-9). The documentary criterion (IND-1) and the record criterion (IND-10) carry their Certified points from the Verified evidence. The AR tier is **Certified**.

8.4 Evidence bar. Each criterion states an **evidence bar** (Clause 6). Where the bar is not met the criterion shall score **0** — no evidence is 0 points, never a discard from the pool. A manufacturer self-declaration shall not earn points above the rung its independent corroboration supports.

8.5 Null-result and regime rules. For IND-10 a recorded search of the public recall and regulator databases, with its coverage stated, shall earn the criterion’s null-result rung where no adverse record is found; an unrecorded search shall not. Where a mandatory public reporting regime covers the class, the full Unverified ceiling of IND-10 is reachable (Clause 6.10).

8.6 Company-wide fallback. Where a criterion offers a company-wide fallback (IND-8, IND-10) and model-specific evidence is unavailable, manufacturer-wide records shall earn the stated fallback points (VRS-GEN-005 §6); the substitution shall be recorded per Clause 10.

8.7 AR tier. The AR tier is the lowest tier among the criteria that determined the letter, and shall not exceed the model’s Intrinsic Rating tier (VRS-GEN-006 §7).

9 Underwriting and credit use

9.1 The letter is an opinion above the compliance floor, not a certification, and shall not be published or imply that any real robot holds a Veyrum rating.

9.2 The per-class letters and the recorded exposure envelopes are the underwriting hooks: the letter informs rate relativity, and the covered classes inform coverage scope, so that operation outside the assessed envelope is an exclusion or a condition rather than an implied covered risk. Three loss drivers shall be surfaced separately so an underwriter can weight them independently of the letter: the **production-interruption severity** driver (IND-7 throughput and IND-8 recovery under multi-shift duty, so that business-interruption and fleet failure-cascade severity are visible); the **intervention-exposure** frequency driver (the share of serious industrial-robot harm that occurs during jam-clear, teaching and repair, read from IND-6 and IND-8 rather than hidden inside a downtime figure); and the **correlated cyber-catastrophe** driver (IND-9 fleet update and network isolation, recording whether the shared control plane holds an IEC 62443-4-2:2019 evaluation, so that a per-fleet accumulation limit can be set).

9.3 For credit, the reliability, recoverability and residual drivers shall be readable from the recorded per-criterion points to inform LTV, residual curves and end-of-support assumptions: IND-7 and IND-8 inform duty-cycle wear and time-to-repair, and the intrinsic reliability, serviceability and support criteria drawn into the pool (Clause 5) inform the obsolescence assumption.

10 Result recording

The rating record shall carry, per VRS-GEN-009: the displayed sector letter and the per-class letters with the exposure envelope each was issued at; the **per-criterion points** earned across the sector criteria (Clause 6) and the contributing intrinsic criteria (Clause 5); the **not-applicable set** removed for each class and the resulting applicable-pool range; the contributing intrinsic criteria used; the AR **tier**; the **edition** (VRS 2026); and the VRS-IND-501 data-twin version. Recording flows to the Passport per VRS-GEN-009; no personal information shall be stored (VRS-GEN-012 §5.2).

11 Assessor checklist

An assessor with this Protocol and the evidence shall reach the same result by executing the following in order; no step admits an unrecorded judgement call, and any deviation shall be recorded with its basis:

- ☐ Application class(es) confirmed (mobile / manipulator / legged-other) with each exposure envelope (Clause 1.2; VRS-IND-001 §4).
- ☐ Assessment tier fixed (Clause 8); the not-applicable set recorded per class and the applicable-pool range computed (Clause 4).
- ☐ Contributing intrinsic criteria drawn from their source standards at their own points and tiers (Clause 5).
- ☐ **IND-1** anchor-regime conformity scored; a declaration of conformity exists for the rated version (evidence bar).
- ☐ **IND-2** protective stop at envelope limits scored; numeric limits declared (evidence bar).
- ☐ **IND-3** human/obstacle detection scored, or removed for a class without a declared detection field.
- ☐ **IND-4** collaborative-operation controls scored, or the fixed non-collaborative 6 recorded where no collaborative mode is declared.
- ☐ **IND-5** degraded-sensing behaviour scored.
- ☐ **IND-6** restart and interlock discipline scored.

- [] **IND-7** industrial duty-cycle throughput scored.
- [] **IND-8** fault recovery and repair scored; company-wide fallback recorded if used.
- [] **IND-9** fleet network exposure controls scored.
- [] **IND-10** industrial field record scored; null-result search and regime rule applied per Clause 8.5; company-wide fallback recorded if used.
- [] Points added and divided by the applicable-pool range; letter read from the bands (Clause 7.1).
- [] Letters issued per class; the lowest displayed (Clause 4.3); each award held at its assessed-tier ceiling (Clause 6).
- [] Result recorded to the passport: per-criterion points, not-applicable set, contributors, tier, edition and twin version (Clause 10).

12 Annex A (informative) — Worked example

FICTIONAL EXAMPLE — not a real product; illustrates mechanics only.

A fictional driverless industrial truck, model code **IND-AMR-01**, is assessed for the **mobile** application class at the **Verified** tier: a manufacturer evidence pack is examined and no behaviour is witnessed. All ten sector criteria apply to the mobile class, and the sixteen contributing intrinsic criteria of Clause 5 are drawn from their source standards at their own Verified points. The model declares no collaborative mode, so IND-4 takes the fixed non-collaborative value of 6.

Sector criteria (Verified tier).

§	CRITERION	VERIFIED CEILING	POINTS EARNED
6.1	IND-1	13	13
6.2	IND-2	12	12
6.3	IND-3	10	10
6.4	IND-4	9	6 (no collaborative mode)
6.5	IND-5	6	6
6.6	IND-6	6	6
6.7	IND-7	8	8
6.8	IND-8	6	6
6.9	IND-9	7	7
6.10	IND-10	8	6
Sector subtotal		85	80

Contributing intrinsic criteria (Verified tier). Drawn at their own points, the sixteen criteria of Clause 5 have a combined range of 163 points and a Verified ceiling of 139; this model earns **133** of them (each at its Verified ceiling except the primary protective function SF-4, earning 8 of 11, and the field failure rate RL-3, earning 9 of 12).

Letter. The applicable pool for the mobile class is the sector range 100 plus the contributor range 163 = **263 points**. Points earned = 80 (sector) + 133 (contributors) = **213**. As a percentage of the pool, $213 \div 263 = 81.0\%$, which falls in the **AA** band ($\geq 75\%$, below AAA's 90 %). The result is **Industrial AR: AA (VRS 2026) – Verified**.

Tier ceiling by construction. At the Verified tier the pool's own ceiling is $224 \div 263 = 85.2\%$, so AA is the best letter attainable without a witnessed demonstration (Clause 7.2); AAA would require Certified-tier evidence. No separate modifier is applied — the ceiling does the work.

Loss-driver read. IND-7 and IND-8 feed the production-interruption severity driver; IND-6 and IND-8 feed the intervention-exposure frequency driver; IND-9 records that the fleet update plane carries an IEC 62443-4-2:2019 evaluation for the correlated cyber-catastrophe accumulation limit (Clause 9.2).

Refusal variant. Had **IND-AMR-01** held no ISO 3691-4:2023 or ANSI/A3 R15.08 conformity for the mobile class, IND-1 would score at its low no-evidence rung (5 for self-declaration only, 0 for none) rather than 13, and the letter would fall out of the reduced total — there is no separate safety-floor modifier. Numbers illustrate mechanics only.

13 Bibliography

The full IND anchor regime is verified in VRS-IND-001; the following are the anchors this Protocol's criteria and evidence tiers (Clauses 6 and 8) rest on, dated at point of use:

- ISO 10218-1:2025 / ISO 10218-2:2025 — Robotics — Safety requirements — Part 1 (industrial robots) / Part 2 (robot applications and cells) (iso.org/standard/73933); third edition published February 2025, replacing the 2011 editions and absorbing ISO/TS 15066:2016 — manipulator-class anchor (IND-1) and collaborative-mode values (IND-4).
- ISO 3691-4:2023 — Industrial trucks — Safety requirements and verification — Part 4: Driverless industrial trucks and their systems (iso.org/standard/83545.html) — mobile-class detection/safe-stop anchor (IND-1/IND-2/IND-3).
- ANSI/A3 R15.08 (Part 1 2020, reaffirmed 2026; Part 2 2023; Part 3 2026) — Industrial Mobile Robots — Safety Requirements; packaged with ANSI/ITSDF B56.5-2024 (webstore.ansi.org) — mobile-class anchor (US).
- ISO 13849-1:2023 / IEC 62061:2021 — Safety of machinery — safety-related parts of control systems (performance level PL / safety integrity level SIL) — functional-safety evidence for the legged-other class (IND-1).
- IEC 62443-4-2:2019 — Security for industrial automation and control systems — component requirements (webstore.iec.ch/publication/34421) — IND-9 fleet update/control-plane lane.
- ISO 14224:2016 — Collection and exchange of reliability and maintenance data for equipment (iso.org/standard/64076.html) — IND-8 reliability and repair lane.
- ISO 8373:2021 — Robotics — Vocabulary (iso.org/standard/75539.html) — robot-term basis.
- Machinery Regulation (EU) 2023/1230 (applicable 20 January 2027) (eur-lex.europa.eu) — EU market safety-floor context.

14 Change history

DATE	VERSION	STATUS	CHANGE	AUTHORITY
2026-09-15	1.0.0	Draft	VRS 2026 rewrite: replaced the re-weighted-mean scoring (Clauses 4–8) with a point-summed pool — ten sector criteria IND-1...IND-10 (100 points; Clause 6) plus the named contributing intrinsic criteria (Clause 5), expressed as a percentage of the applicable pool and mapped to a letter by VRS-GEN-006 §4; added per-criterion tier ceilings, the letter-band/pool-ceiling/class-applicability clause (Clause 7), evidence-by-tier (Clause 8), a regenerated Verified-tier worked example (Annex A) and a per-criterion checklist (Clause 11); re-anchored the former §7 caps into criterion rungs and evidence bars (7.1 safety-floor → IND-1; 7.2 degraded-mode/override → IND-6 + SF-9; 7.3 uninstrumented-evidence → IND-10); retired confidence bands, provisional flags, renormalisation, weighted-mean, assessed-unrated and stage- prior markers; dropped GEN-201/GEN-202 references; VRS-IND-501 data twin regenerated by the dispatcher from Clauses 5–7; see GEN-005 §6.	VRS 2026 rewrite Stage 4
2026-09-14	0.2.0ε1	Draft	COHERENCE: corrected stale exposure cross-reference in §8.1 — “VRS-GEN-012 §4.1” (evidence-grade scale) → §7 (Exposure and denominators). Editorial only; no requirement, weight, band, or constant changed; twin unaffected.	Curator Run #159; charter COHERENCE
2026-09-12	0.2.0	Draft	ACTUARIAL: insurance/finance fitness review (5-question test per criterion) surfaced and closed the protocol’s rating-fitness gaps on the VRS-SVC-201 v0.2.0 exemplar. Added industrial-op-hours exposure denominator (§8.1), evidence-lane conformity-artefact reuse (§8.2, IND anchors re-verified 2026-09-12: ISO 10218-1/-2:2025, ANSI/A3 R15.08 Parts 1–3), per-criterion loss-driver mapping incl. production-interruption severity and intervention-exposure drivers (§5.2), degraded-mode/override and uninstrumented-evidence caps (§7.2/§7.3), per-class letters and admissibility gates (§4.3/§4.4/§8.4), underwriting/credit use (§9, GEN-009), passport recording (§10), assessor checklist (§11), worked example producing per-class letters (Annex A), Bibliography with dated anchors. Retired all bare CALIBRATION-PENDING markers → stage prior labels (VRS-GEN-202). No weight, band or sufficiency-constant value changed; twin	Curator Run #76; charter ACTUARIAL

DATE	VERSION	STATUS	CHANGE	AUTHORITY
			<code>industrial.rubric.v0.json</code> unchanged (IND-501 twin question logged to <code>design-questions.md</code>). Net +≈2,270 words (825→3,095); shall 9→49. No requirements deleted.	
2026-09-05	0.1.0	Draft	Initial draft — document form of the industrial rubric data twin; anchor-compliance cap formalised as modifier	Framework Design Brief v1.1; CEO goal 2026-09-05

About Veyrum Research Institute

Veyrum Research Institute is the research arm of Veyrum — the independent intelligence and trust layer for the robotics industry (research, ratings and registry, advisory, data, and specialist insurance & finance introductions).

Disclaimer

The opinions in this document are independent and current as of the date of publication, based on information believed reliable; they are not guarantees or warranties of safety, fitness, or compliance, and are not engineering, legal, or financial advice. This document may be revised. © 2026 Veyrum.

Contact: hello@veyrum.com · VRS-IND-201 · Version 1.0.0